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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/645,690	08/24/2000	Lizhong Sun	4215/PDD/CMP/RKK	4428

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EXAMINER

WINTER, GENTLE E

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 01/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/645,690

Applicant(s)

SUN ET AL.

Examiner

Gentle E. Winter

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18,26-31 and 33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18,26-31 and 33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Arguments*

1. Applicants argued:

Applicants respectfully disagree with the Examiner and point out that Small et al. does not teach, show, or suggest a method of cleaning a polishing pad surface comprising applying to the polishing pad surface a cleaning composition including about 0.1 to about 3.0 M.% of at least one organic compound containing one or more amine or amide groups, an acid or a base in an amount such that the composition has a PH of about 5.0 to about 12.0, and water, as recited in claims 1, 12, 26, and claims dependent therefrom.

2. Applicant's argument is accepted. Small is provided for the teaching of cleaning a wafer using a polishing pad, and the secondary reference is provided for the teaching that the chemistry used to clean the pad is effective on the wafer. As was indicated previously, parsing the art and arguing that the references, taken individually do not amount to an anticipation rejection is unlikely to result in the indication of allowable subject matter.

3. Applicants argued:

In addition, the Examiner has erred in stating that explicitly disclosed range of the amine is 3-20%. Applicants respectfully point out that the cited 3-20% of amine concentration in water is not directed to the post clean treatment composition of Small as the Examiner stated, but rather a statement of the background problem that need to be solved by Small's post clean treatment solution so as to rapidly neutralize amine and prevent corrosion of metal structure and other features on a wafer. (See, column 3, lines 54-62)

4. Applicants appear to acknowledge that the prior art of record discloses that the disclosed amine range is desirable, that is 3% and less. The art recognizes that significant quantities of amine provide deleterious results.

5. Applicant continued:

Further, with regard to the PH range, the acidic pH range of about 3.5 to 7 of Small's post clean treatment composition is provided to neutralize the pH of a wafer until the pH reaches 7 and prevent corrosion of metal structure on a wafer during rinsing.

6. Exactly what is intended by a step is less relevant than that the same step is undertaken, a point seemingly acknowledged by applicant.

Applicant further argued:

Small does not teach, show, or suggest the claimed composition in the claimed range for the claimed method and nowhere does Small provide motivation to use Small's composition for cleaning a polishing pad between polishing a first and a second wafer. The advantage of Small's post clean treatment composition as a rinsing composition for a wafer as stated by the Examiner and disclosed in Small does not provide motivation or rationale for cleaning a polishing pad between polishing a first and a second wafers. Withdrawal of the rejection is respectfully requested.

7. At this time, it is not clear if applicant is suggesting that the motivation for cleaning the polishing pad exists, or if the motivation for the disclosed method exists. It is presumed that applicant is not suggesting that there is no motivation for cleaning the pad. This examiner relies on the motivation and rationale of record.

Applicant concluded:

Applicant respectfully traverses the rejection. Small Svirchevski et al., and Kennedy et al. have been discussed above. Small does not teach, show, or suggest the method and composition as claimed and Svirchevski et al. and Kennedy et al. do not teach, show, or suggest the composition as claimed. As discussed above, there is no motivation in the references to combine Small's wafer cleaning composition with Svirchevski et al. and Kennedy et al.'s polishing pad cleaning method despite the disclosure of flow rates in the method of Svirchevski et al. and Kennedy et al. Further, Small's composition works by rinsing a wafer in a bath such as immersing the wafer for a duration of 30 min (Example 2) to 24 hours (Example 3) rather than for cleaning a polishing pad surface for a short time period after CMP. Thus, Small does not teach, show, or suggest applying Small's post clean treatment solution to a polishing pad for about 3 seconds to about 20 seconds after conducting CMP as recited in claims 18, and 30, and can not be served as basis for the Small composition to be combined with Svirchevski et al. and Kennedy et al.

8. Since applicant does not argue that the aggregated references fail to teach the invention, and since the rejection is base on obviousness, applicant's arguments drawn to arguments that the references individually do not teach the invention are not argued. This examiner does not recognize the above as an attack on the motivation however the same is presumed. This

examiner believes that the reasons for making the claimed motivation are sound and proper. As such, the rejections cannot be withdrawn at this time.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 8, 12-14, 16, 26, 27 and 33 rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 5,981,454 to Small and United States Patent No. 6,352,595 to Svirchevski et al.
2. Small discloses a method of cleaning a wafer using a polishing pad see e.g. column 2, line 55. Small discloses applying to the wafer a cleaning composition comprising a composition that has an amine concentration that includes at least one endpoint of the claimed range, specifically 3.0 Wt% of at least one organic compound containing one or more amine or amide groups. It is noted that the solution is applied to the polishing pad surface by transfer from the wafer of Small. Small discloses this at e.g. column 2, line 55 *et seq.* The explicitly disclosed range is 3-20% (column 3, line 52 *et seq.*) however figure 3 appears to contemplate a range of activity below 3% (see e.g. column 4, line 6 *et seq.* and also see figure 3). Small further discloses an acid or base such that the composition has a pH of between 3.5 and 7, which anticipates the range 5.0 to about 12.0, and water. See (column 2, line 37 *et seq.* and column 3, line 52 *et seq.*). Small further discloses using DI water, ethylene diamine, and acetic acid

(column 14, line 43 through column 16). A water rinse is also disclosed (column 1, line 38 *et seq.*). It is noted that the argument that the Small reference is drawn applying the cleaning solution to the pad and not the wafer, is not persuasive because applying the solution to the wafer is deemed an intermediate step. In the end, the solution *is* applied to the cleaning pad. If applicant wants to recite that the cleaning solution is applied *directly* to the pad, such would seemingly distinguish the instant claims over Small. However, it follows that a solution that is effective for removing compounds from the wafer would similarly be effective for removing compounds from a pad.

3. With respect to claim 12 and dependant claims, the arguments and claim recitation of a *first* and *second* wafer and an intermediate cleaning step precludes the possibility of a wafer being present during the cleaning and as such the anticipation rejection is withdrawn.

4. The secondary reference provides the missing element and Small explicitly provides the motivation for making the instant combination. Specifically, Svirchevski discloses a method of cleaning a chemical mechanical polishing (CMP) pad that has already been used for performing a CMP operation on a wafer surface, the CMP pad having a residue on a surface of the CMP pad, the method includes applying chemicals to the surface of the CMP pad and thereafter rinsing the pad. The chemical disclosed in Small is disclosed to be useful because it eliminates the need for flammable solvents, lowers transition metal ion concentrations, and has a high neutralization capacity. The rationale for cleaning between a first and second wafer would include minimization of contamination build-up and minimization of subsequent bath contamination.

5. Claims 12-14, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Small as set forth above and United States Patent No. 6,352,595 to Svirchevski et al.

6. Claims 12-14 and 16 disclosing the sequential steps of conducting a CMP on a first wafer surface of a first wafer containing copper or copper based alloy on a surface-polishing pad. It is not altogether clear if "water" was intended to be "wafer". Thereafter the first wafer is removed from the pad, and cleaning composition is applied to the pad, followed by a rinsing step. Finally, a second wafer is provided and the above steps are repeated. The composition is identically disclosed in Small as set forth above. What is not explicitly disclosed is the cleaning of the pad between polishing a first wafer and second wafer. This sequential order appears to require that a wafer is not take part of the pad cleaning operation. This inference is supported by the terms "sequential" and the identification of a "first" and a "second" wafer, which are not in contact with the pad during the cleaning operation. Because the each and every limitation of the claim is not identically disclosed, and is apparently not inherent the anticipation rejection is withdrawn at this time. The secondary reference provides the missing element and Small explicitly provides the motivation for making the instant combination. Specifically, Svirchevski discloses a method of cleaning a chemical mechanical polishing (CMP) pad that has already been used for performing a CMP operation on a wafer surface, the CMP pad having a residue on a surface of the CMP pad, the method includes applying chemicals to the surface of the CMP pad and thereafter rinsing the pad. The chemical disclosed in Small is disclosed to be useful because it eliminates the need for flammable solvents, lowers transition metal ion concentrations, and has a high neutralization capacity. The rational for cleaning between a first and second wafer would include minimization of contamination build-up and minimization of subsequent bath contamination.

7. Claims 4-7, 9-11, and 28-31, as currently understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Small and United States Patent No. 6,280,299 to Kennedy.

8. Each and every limitation of claims 6, 7, 9, 10, and 11 are identically disclosed in Small, except that Small apparently fails to explicitly disclose applying the solution to a rotating polishing pad at a flow rate of about 10 to 600 ml/min. Kennedy et al. discloses using a flowrate between 230 and 6000 ml/min (e.g. column 6, line 58 *et seq.*). The artisan would have been motivated to make the instant combination for the reasons explicitly set forth in Kennedy et al. Kennedy discloses that the pad cleaning flowrates and pressures are optimized based on the conditions and materials used in the pad cleaning process. In a larger sense, the artisan would have been motivated to select a flow rate high enough to reduce the pad loading to an acceptable level, while minimizing solvent waste. Similarly, it is submitted that duration of the flow would be a matter of routine optimization, but is explicitly disclosed in Kennedy et al. as about 5 to 20 seconds (see e.g. column 7, line 47 *et seq.*). Again, the motivation is explicitly disclosed in Kennedy et al. specifically, optimizing the cleaning of the pad. Further, Kennedy et al. and the instant invention appear to be performing substantially the same task, in substantially the same way, for substantially the same reason.

9. With specific respect to claims 4 and 28 the claims, as amended disclose a pH range of "about 8 to about 11". While these values may not be contextually taught with identical values the taught value of "about 7" seemingly would read on "about 8", however if it is asserted that there are real material differences observed between a pH of 7 and a pH of 8 seemingly such evidence would overcome the obvious rejection. But note that pH values of greater than 10 (and therefore including 11) are disclosed in Small, see e.g. column 4, line 3.



10. Claims 15, 17, and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Small Svirchevski and Kennedy as set forth above.

11. Each and every limitation of claims 17, and 18 is disclosed in the combination of Small and Svirchevski as set forth above with respect to claim 12, except that Small and Svirchevski apparently fail to explicitly disclose applying the solution to a rotating polishing pad at a flow rate of about 10 to 600 ml/min. Kennedy et al. discloses using a flowrate between 230 and 6000 ml/min (e.g. column 6, line 58 *et seq.*). The artisan would have been motivated to make the instant combination for the reasons explicitly set forth in Kennedy et al. Kennedy discloses that the pad cleaning flowrates and pressures are optimized based on the conditions and materials used in the pad cleaning process. In a larger sense, the artisan would have been motivated to select a flow rate high enough to reduce the pad loading to an acceptable level, while minimizing solvent waste. Similarly, it is submitted that duration of the flow would be a matter of routine optimization, but is explicitly disclosed in Kennedy et al. as about 5 to 20 seconds (see e.g. column 7, line 47 *et seq.*). Again the motivation is explicitly disclosed in Kennedy et al. specifically, optimizing the cleaning of the pad. Further, Kennedy et al. and the instant invention appear to be performing substantially the same task, in substantially the same way, for substantially the same reason.

12. With specific respect to claim 15 the claim, as amended discloses a pH range of "about 8 to about 11". While these values may not be contextually taught with identical values the taught value of "about 7" seemingly would read on "about 8", however if it is asserted that there are real material differences observed between a pH of 7 and a pH of 8 seemingly such evidence

would overcome the obvious rejection. But note that pH values of greater than 10 (and therefore including 11) are disclosed in Small, see e.g. column 4, line 3.

***Conclusion***

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403. The examiner can normally be reached on Monday-Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for

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the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gentle E. Winter  
Examiner  
Art Unit 1746

December 22, 2003

*Zeinab Elarini*

**ZEINAB EL-ARINI  
PRIMARY EXAMINER**